Encouraging Innovation Across WMO

A WMO HydroHub Case Study

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The Eighteenth World Meteorological Congress (Cg-18) articulated a clear and urgent need for innovation to deliver better and more timely weather, climate and water services to stakeholders. The term is mentioned 58 times in the Cg-18 report – four times more often than in the report from the previous Congress. The Cg-18 report expresses the need to support, promote, foster and accelerate innovation. However, the report does not concisely define innovation for WMO, nor Members' expectations. But both definitions are essential to effectively encourage and implement the "culture of innovation" advocated by Cg-18 and to carve out the benefits that innovation can bring for WMO Members.

When the WMO HydroHub was established in 2015, one of the areas it was to address was innovation. A team from the WMO Secretariat and the Swiss Agency for Development and Cooperation (SDC) met on 14 October 2015 to take up the challenge of defining and encouraging innovation in hydrology within the WMO context. The outcome was the WMO HydroHub Innovation component, designed to identify and test new mechanisms and new technologies for hydrometry[3], while contributing to the implementation of WMO strategy and projects. In the two and a half years since its launch[4], the crucial elements required to achieve these goals have been identified, developed and tested in practice. Specific insights were gained in the process, which could translate to a definition of innovation in the broader WMO community.

Why innovate

Innovation should be on everyone's agenda. Driven by changing customer needs, new technological possibilities and ever shorter product life-cycles, providers of goods and services in both the public and private sector have to rethink the way they create and capture value. Innovating along the whole value chain has become a vital capability.

The private sector has long recognized the ability to innovate as a fundamental requirement for sustained economic growth. In its *Global Competitiveness Report 2018* [5] the World Economic Forum bases the competitiveness of modern economies on their ability to embrace change and their having an "innovation ecosystem" that allows "new ideas to emerge [...] as new products and services".[6]

The United Nations has also recognized the need to increase its innovation efforts. UN Secretary-General António Guterres has issued a strategy on new technologies[7]. The UN International Children's Emergency Fund (UNICEF) and the World Food Programme (WFP) founded the UN Innovation Network (UNIN) in 2015 to informally exchange knowledge and

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3 Hydrometry refers to the measurement of components of the hydrological cycle, namely water level, discharge, precipitation and others

4 January 2017

5 weforum.org/reports/the-global-competitveness-report-2018

6 reports.weforum.org/global-competitiveness-report-2018/chapter-3-benchmarking-competitiveness-in-the-fourth-industrial-revolution-introducing-the-global-competitiveness-index-4-0/

7 un.org/en/newtechnologies/

experience on innovation. Today, UNIN has 65 chapters, covering over 70 countries[8]. The UN Development Programme (UNDP) has established 60 Accelerator Labs in 78 countries[9]. The World Bank has made extensive use of Innovation Labs[10] for years. There is also the International Telecommunication Union's (ITU) AI for Good[11], which aims to promote the use of artificial intelligence to support implementation of the Sustainable Development Goals.

We are the ones that innovate, you can support by leveraging our capacities and connect us with the right partners.

Academia and research institutions complement innovation efforts by driving new developments, innovation parks, start-ups and cross-sector partnerships. One example is the International Association of Hydrological Sciences (IAHS) MOXXI Working Group[12], a partner of the HydroHub, which fosters new technologies for hydrology.

The recipe for innovation

Following the principle of ask-learn-share, the HydroHub embarked on this journey by looking at and benefitting from the experiences of others. The objectives of innovative commercial companies are not so different from those of WMO as both strive for:

- decreased time-to-impact (market) for new solutions
- streamlined processes to reduce costs
- optimized activity portfolios
- new ways of interacting with customers and stakeholders to sustain long term success (e.g. new business models)
- accelerated transfer of scientific and technological advancement into operations
- consolidated infrastructure to reduce costs, and
- new solutions that cut across established functional silos.

WMO should, therefore, be able to draw from decades of experience with theoretical and practical innovation management and apply similar methods for implementation.

The recipe and ingredients for innovation in the private sector are clear[13]: formulate the vision and objectives together with stakeholders, define organizational structures, funding mechanisms, principle processes and supporting tools. Once in place evaluate, revise, repeat.

The importance of an innovation vision

Opportunities to innovate are vast, therefore, it is crucial in view of budget limitations to align innovation priorities with Members' expectations. An innovation strategy that defines "what we want to be" and "where we want to play" is essential for the efficient use of resources.

Intuitively, innovation is all about generating new good ideas and technologies. But there is an inherent risk that even the best ideas get lost, if never turned into a product or service to be consumed by a user. Therefore, the innovation process should always include conversion/testing and diffusion and scaling (Figure 1, page 45).

On an organizational level an enabling environment is needed to generate or collect ideas, which may solve the global, regional and local challenges faced by the WMO community. Once a good idea is identified, it is necessary to prioritize implementation, and to understand and identify the right technologies and

8 uninnovation.network/about-us

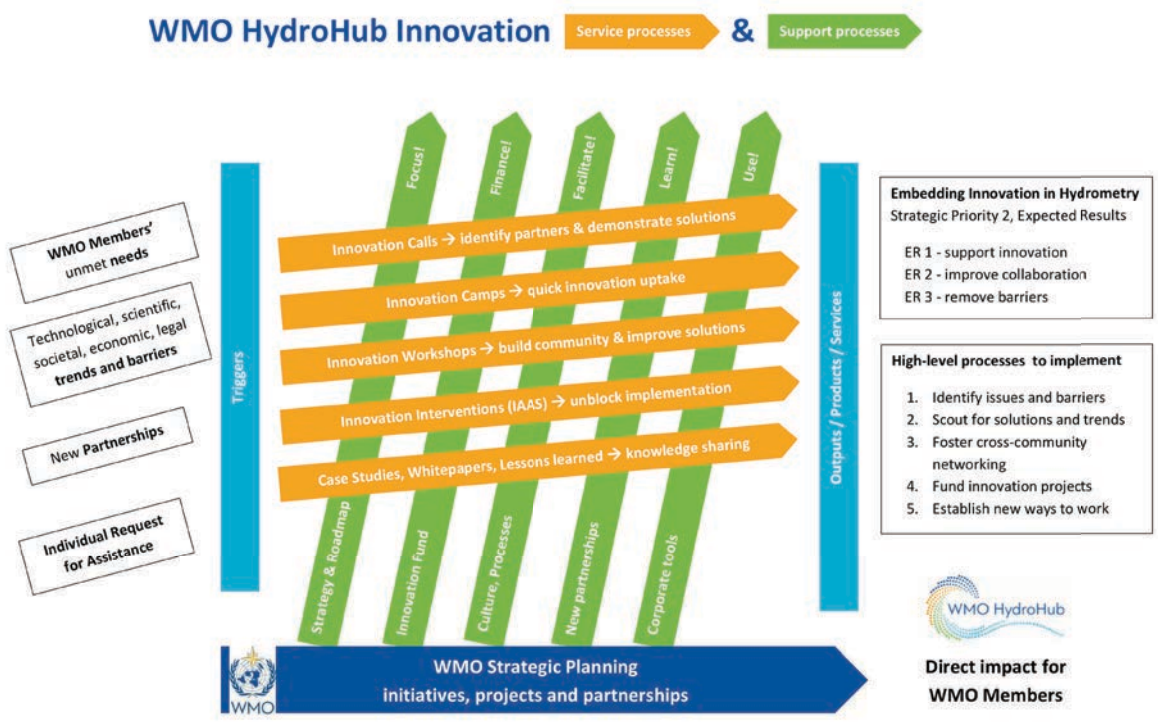
9 acceleratorlabs.undp.org/

10 blogs.worldbank.org/voices/what-are-innovation-labs-and-how-can-they-improve-development-0

11 aiforgood.itu.int/

12 Measurements and Observations in the 21st century

13 Innovation has been studied for over 80 years, possibly starting with "Capitalism, Socialism and Democracy" published in 1942 by Joseph Schumpeter. Modern innovation management often quotes "Innovation and Entrepreneurship: Practice and Principles" by Peter Drucker from 1985



The WMO HydroHub process diagram: Based on the WMO Strategy, from the left to the right, external triggers start implementation of services processes (orange) that bring tangible outputs and outcomes for WMO Members. Support processes (green) are put in place to create and maintain the necessary knowledge, partner network and financials to provdie the enabling environment for innovation.

partners to tailor solutions for operations. Once tested on the ground solutions have to be scaled up for broader application.

The following innovation enabling components are useful to manage the process from idea to impact:

- a broadly supported and well-communicated innovation strategy to ensure an alignment of objectives and derived activities
- a curated and updated innovation road map with needs identified and prioritized and mapped to solutions and partners that can fill the gaps
- a prioritization of activities based on expected impacts and suitable timelines for the availability of solutions
- a portfolio of services such as innovation challenges or interventions for direct and indirect impact on the ground, systematic learning and improvement, change of organizational culture
- a network of partners from WMO and other communities to generate bright ideas and implement solutions
- an organizational structure with defined roles, responsibilities and clear interfaces
- a funding mechanism for innovation activities and projects.

However, even if all is in place there is still no guarantee that innovation will be successful as innovation is ultimately about people, knowledge and culture.

The HydroHub Innovation experience

The HydroHub Innovation Committee, an oversight body composed of representatives of international organizations, of the public, private, academic sectors and the SDC focal point, started its work in the end of 2017 by aligning expectations to the reality of what could be achieved by the innovation component. The

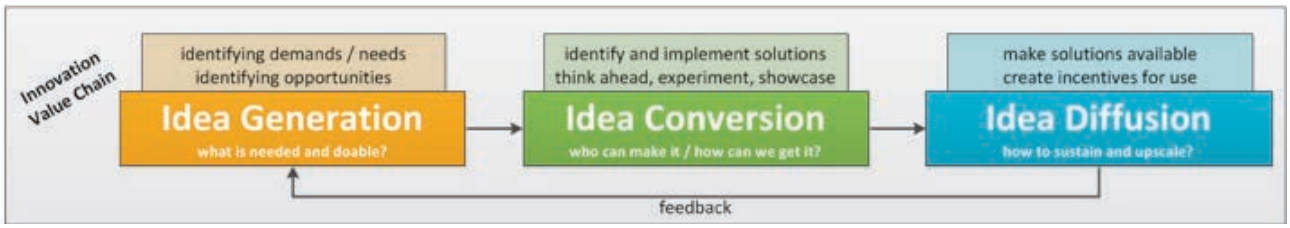


Figure 1. Innovation value chain

intention was to create a small but dedicated team within WMO that would foster, enable and facilitate innovation activities across the whole Hydrometry community. Key overall was to create real and sustainable impacts for Members.

Over the first months of discussion, the notion of an enabling environment and a guiding framework took shape. The focus was set on operational uptake and upscaling of already existing solutions – in contrast with adding new solutions to an already vast portfolio. The HydroHub Innovation component was to become a facilitator more than an inventor or implementer.

After having carved out "what we want to be" the task was to answer the question "where we want to play". The HydroHub Strategic Plan identifies three strategic activity areas – sensor technologies and monitoring techniques, data management and management processes – and sets the expected results for innovation activities:

1. Increased support for innovation in hydrometry and data sharing

2. Improved collaboration between National Meteorological and Hydrological Services (NMHSs), the research community and the private sector in the area of hydrometric innovation

3. Removal of barriers to the use of innovative technologies by NMHSs and others collecting hydrometeorological data.

This represents a clear shift away from an initial focus on gadgets towards pragmatically supporting operational uptake to collect and share more water data.

On the basis of its Innovation Strategy and the prescribed approach for identifying partnerships, the HydroHub Innovation component moved on to develop and test the mechanisms and tools for their systematic implementation. A communication plan was also developed to explain how HydroHub innovation activities would contribute to the bigger picture at WMO.

HydroHub Innovation calls

The HydroHub uses innovation calls to address multiple target areas at once: A call announces a prioritized challenge that has been identified in the WMO Community, triggering discussions that ultimately lead to several proposals to the Innovation Committee (IC) to address the problem. The IC selects a solution and implementation starts. Though-out the process the WMO HydroHub in-sources knowledge from participants and steadily grows its partner network, while ensuring the requested deliverables are provided.

The First HydroHub Innovation Call addressed the observation of freshwater quantity parameters. Instead of asking for a new technology, it called for a demonstration of existing technologies, which could reduce total cost of ownership for NMHS, and for manufacture blueprints to be shared with local suppliers. This would enable local suppliers to produce, maintain and repair equipment, generating jobs and ownership in Least Developed Countries (LDCs) and Small Island Developing States (SIDSs).

The selected solution combined technologies with a new business model. The implementation partner, Northern Widget LLC from Minnesota, USA, was awarded for their sound expertise and experience in the field as well as for delivering a full open source solution: a telemetred data logger and a water level sensor, together with a self-manufacture manual and programming guide that will allow NMHSs to

replicate the solution without external support. This satisfies the key deliverable concerning knowledge transfer to the NMHS in LDCs – the test cases are in Afghanistan and Bhutan – proving that the "uptake package" is fit for use.

Though just a small contribution in terms of technology, the innovation call project demonstrates how NMHSs can be empowered and dependency on foreign aid and technology can be reduced.

Innovation Workshops

HydroHub Innovation Workshops, co-organized with partners like IAHS-MOXXI, also proved to be effective tools for networking and partnership building. For example, at the second Innovation Workshop, held in New York City in March, NMHSs[14] discussed how they improve and maintain their hydrological monitoring networks and directly addressed potential solution providers, explaining their needs and issues with technologies. Key issues raised by the NMHSs included:

- How to address the fact that the capacity of batteries in certain parts of Africa might decrease maintenance intervals from two years to just eight months?
- How robust should housing be for a hurricane region like Barbados?
- How to address the fact that shipping and customs to repair a sensor in Europe or America can be more expensive than the sensor itself?
- How to deal with vandalism and theft?
- What to do if a visa is required to physically access a hydrological station for maintenance?

Until then, the researchers had concentrated on technologies and remained oblivious to such details. But in the context of the workshop their customers, our colleagues from the national services, felt empowered to start a fruitful dialog with their suppliers, and requested solutions that better fit their needs.

In fact, in response to the workshop, Northern Widget decided to add an optional solar panel to charge the batteries of the data logger, compensating for the lower capacity batteries. Optimizing power consumption is still indicative to reduce the size of the solar panels, so that installations can be hidden to reduce vandalism and theft.

While not solving all issues, the feedback loop to learn and improve has been established between the communities and it will gradually lead to more adequate products and services.

Addressing daily challenges

The innovation component of the HydroHub now concentrates on setting up a contact point for NMHSs of LDCs and SIDSs for more direct answers to on-the-ground concerns. A number of national services have already reached out to share their daily challenges. The HydroHub aims to address some of these challenges in an innovative, pragmatic and unbureaucratic way.

Every case of a bilateral activity is different but general support mechanisms have been defined:

- The Innovation Intervention: A specific, focused, short-term support activity to boost ongoing innovation projects within the range of the HydroHub's capabilities. Usually provided by a consultant, it is a small investment with potentially huge impact.
- The Innovation Camp: A two to five day activity that brings together internal and external experts to solve a specific problem on the ground. National or regional teams provide and sponsor an urgent challenge that needs time and external expertise to be resolved. The HydroHub then provides support for the organization, access to its extensive network of experts and, if available, financial support to conduct the local innovation camp.
- Innovation as a Service: The HydroHub provides innovative solutions to diverse work packages within the context of the WMO Country Support Initiative, Climate Risk and Early Warning Systems

14 Especially Argentina, The Gambia and Tanzania

Initiative (CREWS), WMO Hydrological Cycle Observing System (WHYCOS) and other frameworks. Examples could be a tailored procurement for low-cost technologies, the organization of a gamified stakeholder workshop or the creation of a specific software tool.

Extensive documentation of experiences and the authoring of knowledge products accompanies these bilateral impact activities.

In addition to the above activities, the HydroHub provides an Innovation Road Map which compiles unmet needs, trends and gaps analysis. The goal is to facilitate the planning and selecting of future activities and to communicate goals and incentives to current and future partners. Finally, an innovation portfolio lists successful proven solutions that can be requested by Members.

While the HydroHub approach to innovation has shown some encouraging results, not all of its structure and activities have proven useful. Its scope, limited to hydrometry, is a disincentive to address other areas. Working with new partners from other communities is seen as out-of-scope even when their knowledge and expertise could make a big difference – innovation happens at the interfaces. But its success in addressing supporting Members with their daily challenges, and improving collaboration and knowledge transfer make it a model that could be applied in the broader WMO context.

Transferring experiences to the WMO

WMO is embracing change – through the reform and restructuring – to facilitate the delivery of innovative solutions for the future. Long established ways of doing things are being questioned and optimized through initiatives and projects:

- The WMO Community Platform[15], which consolidates Monitoring and Evaluation against the WMO Strategic Plan and Member Profiles to understand the most pressing needs of stakeholders and how they scale to other WMO Members
- The Country Support Initiative (CSI)[16], which creates a network of partners, expertise and experts
- The Open Consultative Platform, which fosters cross-sector public, private and academic partnerships.

A change of cultures is under way, yet time is short as the international community urgently needs innovative solutions to address today's global challenges. The shift to an Earth system approach and the opening to academia and private sector will bring further synergies for innovation at WMO and further increase the need for an innovation culture within WMO. All involved will need to embrace lean processes and working together in flexible teams that evolve and change in response to the needs of Members. Changes can be facilitated through corporate tools such as those being rolled out on the WMO Community Platform, which encourage transparency and facilitate interaction.

As we tried to show in this article, innovation management and a subsequent innovation culture are proven tools for breaking down silos and bringing together likeminded individuals that are able to deliver the best results. We therefore emphasize again the need to come together and start building the "culture of innovation" demanded by WMO Members.

15 https://community.wmo.int

16 The CREWS initiative also follows a similar paradigm, www.crews-initiative.org/en